* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to a liquid crystal display and its manufacture method, and relates to the shading structure of a liquid crystal panel of having a light filter especially.
[0002]
[Description of the Prior Art] The liquid crystal panel which pinched various kinds of liquid crystal pours liquid crystal into the interior of the liquid crystal enclosure field formed by the sealant which sticks two substrates, and is formed in it. A light filter is formed in either on two substrates when it is going to colorize this liquid crystal panel.
[0003] It is desirable, although there are various methods among the formation methods of a light filter, among those in order for the method using the photolithography method which applies a coloring resist on a substrate, exposes and develops it, and forms a coloring layer in a predetermined pattern to form a highly precise coloring layer. By this method, in order to form red (R), green (G), and the coloring layer of three colors of blue (B), for example, 3 times of photolithography processes are repeated.
[0004] Between the above-mentioned coloring layers, a black matrix layer is formed and shading between the pixels corresponding to a coloring layer is performed. Although this black matrix layer may use the case where it constitutes from a coloring layer of black, and a metal layer, as shown below, it may be constituted by carrying out a laminating so that the coloring layer which presents a different color tone may be piled up partially so that the almost same shading as the coloring layer of black may be performed.
[0005] Drawing 5 shows the structure of the light filter equipped with the shading section formed by carrying out the laminating of two or more coloring layers in piles. On the front face of the transparent substrate 1, shading section 3BM in which it was formed in by the predetermined array pattern, and red (R), green (G), and the coloring layers 3R, 3G, and 3B of three colors of blue (B) carried out the laminating of the coloring layer of three colors, and were formed between them is formed.
[0006] On these coloring layers 3R, 3G, and 3B and shading section 3BM, the protective coat 4 which consists of a transparent resin is formed through the process of an application, exposure, and baking. Furthermore, on the front face of a protective coat 4, the transparent electrode 5 which consists of ITO (indium stannic-acid ghost) is put by the sputtering method, and is formed of patterning at a predetermined pattern (the shape of for example, a stripe).
[0007] The orientation film 6 is formed in the front face of the above-mentioned transparent electrode 5 with the transparent resin which consists of a polyimide etc. In order to arrange the stacking tendency of liquid crystal, rubbing processing is performed to this orientation film.
[0008]
[Problem(s) to be Solved by the Invention] However, it sets in the structure shown in above-mentioned drawing 5 . In order that the coloring layers 3R, 3G, and 3B and this coloring layer of three colors may form a light filter 3 by shading section 3BM by which the laminating was carried out Although three

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processes are sufficient for a photolithography process, the thickness of shading section 3BM by which the laminating was carried out becomes thick compared with the coloring layers 3R, 3G, and 3B, and it has the trouble that irregularity will be formed in the front face of a light filter 3.

[0009] The shape of toothing of this light filter 3 is not necessarily fully canceled, although flattening is carried out a little with a protective coat 4 or the orientation film 6. If the front face of a substrate 10 is ground in the predetermined direction with the upper shell rubbing roller 7 of the orientation film 6 as shown in drawing 6 , the front face of the rubbing roller 7 will not fully contact to the orientation film 6, but, for this reason, orientation nonuniformity will generate the surface portion A of illustration in the liquid crystal in contact with the surface portion A. It generates in the periphery section of a pixel field, and this orientation nonuniformity causes a poor display of a fall and others of the contrast of a liquid crystal display.

[0010] Then, this invention solves the above-mentioned trouble and the technical problem is in offering the new structure of easing the shape of toothing resulting from the thickness of the shading section, and preventing orientation nonuniformity in the liquid crystal display which has the light filter which formed the shading section by the lap of a coloring layer as mentioned above.

[0011]

[Means for Solving the Problem] The means which this invention provided in order to solve the above-mentioned technical problem In the liquid crystal display equipped with the light filter containing two or more kinds of coloring layers which present a color tone which has the liquid crystal panel constituted by arranging a liquid crystal layer between the 1st substrate and the 2nd substrate, and is different on the substrate of the above 1st It has the shading section which the border area of the aforementioned coloring layer was made to carry out the laminating of two or more [of the aforementioned coloring layers which present a different color tone / at least], and formed them in it, and this shading section has the large width of face of the lower layer aforementioned coloring layer, and is characterized by being constituted so that the width of face of the upper aforementioned coloring layer may become small.

[0012] Since according to this means it is constituted so that width of face may become small as the shading section goes to the upper layer from a lower layer and the shape of toothing of the front face of the orientation film with which the side of the shading section will be mostly formed in the shape of a taper, and was formed on the shading section is eased, on the occasion of rubbing processing, it is hard to generate poor rubbing, and deterioration of display grace can be prevented.

[0013] Here, as for the aforementioned shading section, it is desirable to be formed by carrying out patterning one by one inside the periphery section of the pattern of the lower layer aforementioned coloring layer, as the periphery section of the pattern of the upper aforementioned coloring layer is arranged.

[0014] According to this means, even if it does not process especially the side of the shading section, the almost same effect as the case where the side of the shading section is processed in the shape of a taper can be acquired by changing the formation pattern of the coloring layer of a lower layer and the upper layer one by one, and forming so that the periphery section of the upper pattern may come inside the periphery section of a lower layer pattern.

[0015] In this case, since it can respond only by changing the formation pattern of a coloring layer, it can manufacture, without causing elevation of a manufacturing cost.

[0016] Moreover, the aforementioned light filter is equipped with the aforementioned coloring layer of three colors, and the aforementioned shading section carries out the laminating of the aforementioned coloring layer of three colors to three layers, and may be formed.

[0017]

[Embodiments of the Invention] Next, the operation gestalt of the liquid crystal display applied to this invention with reference to an accompanying drawing and its manufacture method is explained. This operation gestalt is the example which applied this invention using the TN liquid crystal about the penetrated type liquid crystal display of the active-matrix form equipped with the MIM (metal-insulator-metal) element for every pixel. In addition, to various liquid crystal displays, such as a thing using other active elements, such as not only such type equipment but TFT, a thing which has the drive form of a

passive matrix type and others, and a reflected type liquid crystal display, if only this invention is the liquid crystal display equipped with the light filter, it is widely applicable.

[0018] Drawing 1 shows the cross-section structure in this operation gestalt. On the front face of the glass element substrate 10, patterning is carried out so that two or more metal wiring 11 which consists of Ta etc. may stand in a row and may be arranged. The MIM element 12 constituted by forming the counterelectrode which consists of Cr etc. through the insulator layer which consists of the oxide film on anode of Ta etc. to this metal wiring 11 is connected. The transparent electrode 13 which consists of ITO is connected to the MIM element 12. This transparent electrode 13 is an electrode of the flat-surface rectangle corresponding to the predetermined pixel field.

[0019] On the other hand, on the inside in the viewing area D of the opposite substrate 20, the coloring resist liquid which consists of an organic solvent containing the pigment corresponding to red (R), green (G), or blue (B) and a photopolymer is applied by the spin coat method, and the coloring layers 21R, 21G, and 21B with a thickness of about 0.05-3.0 micrometers by which patterning was carried out through exposure and the development process are formed. This coloring layer manufacturing process is carried out by carrying out pattern formation of the coloring layer of the three above-mentioned color by the photolithography method one by one.

[0020] In each pixel field, one layer of either of the coloring layers 21R, 21G, and 21B of the three above-mentioned color is formed, and the laminating of all of the coloring layer of three colors is carried out by patterning of the above-mentioned coloring layer, and it constitutes shading section 21BM from a boundary portion of a pixel field by it.

[0021] On the front face of these coloring layers 21R, 21G, and 21B, an acrylic light hardening type resin is applied, it is made to harden by the UV irradiation of 30 or more mJs, and a protective coat 22 is formed by performing baking for about 30 minutes or more at about 150 degrees C after that. On this protective coat 22, the transparent electrode 23 which consists of stripe-like ITO is formed by sputtering and patterning.

[0022] On the front face of a transparent electrode 23, after applying polyimide resin, a polyvinyl alcohol resin, etc., the orientation film 24 calcinated and formed is formed. Rubbing processing is performed in the predetermined direction with the rubbing roller which is not illustrated on this orientation film 24.

[0023] In addition, after forming the above-mentioned structure in each, the above-mentioned element substrate 10 and the opposite substrate 20 are formed so that it may be mutually stuck by the sealant 31 where a liquid crystal enclosure field is formed, and ** and cell ** may be set to about 5 micrometers by it. And the liquid crystal layer 30 is formed by pouring liquid crystal into the liquid crystal enclosure field. Moreover, a polarizing plate is stuck on the element substrate 10 and the opposite substrate 20 if needed.

[0024] In this operation gestalt, shading section 21BM is formed in as narrow width of face as the upper thing among three coloring layers by which the laminating is carried out, as shown in drawing 3 . For example, if width of face of the coloring layer of most a lower layer is used as a 70-micrometer pattern, by making small about 5 micrometers of right-and-left both sides, the width of face of the coloring layer on it will be formed by the about 60-micrometer pattern, will make small further width of face of the coloring layer of the best layer similarly, and will use it as an about 50-micrometer pattern.

[0025] By doing in this way, the side in which shading section 21BM becomes a trapezoidal shape as a whole, and the adjoining coloring layer is faced is formed in the shape of a taper. Consequently, with this operation gestalt, the shape of toothing on the front face of the orientation film 24 is eased by forming a protective layer 22, a transparent electrode 23, and the orientation film 24. Therefore, with this operation gestalt, as shown in drawing 4 , since the field which a rubbing roll 25 is not contacted at the time of rubbing, but the area of the field which becomes poor [rubbing] is reduced, or becomes poor [rubbing] can be lost, the fall of the contrast of a liquid crystal display object can be suppressed.

[0026] In this operation gestalt, by having formed shading section 21BM on the trapezoid as mentioned above, as shown in drawing 2 , transition region 21S of few color tones are formed in the boundary portion of the periphery section of the coloring layers 21R, 21G, and 21B of each pixel field, and

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shading section 21BM. For example, in the case of transition region 21S formed in the circumference of coloring layer 21B, it moves from the blue color tone of coloring layer 21B to the color tone of the mixed color of the blue of coloring layer 21B, and the red of coloring layer 21R further to the mixed color of three colors which added the green of coloring layer 21G from the mixed color of mentioned 2 color.

[0027] When about 5 micrometers of marginal parts of each coloring layer are shifted and they are formed as mentioned above, transition region 21S are at most 5-10 micrometers in width of face. In this case, since the area of one pixel field is about 150-500 micrometers, the influence on the color tone by the above-mentioned transition region 21S hardly appears.

[0028] With this operation gestalt, although deterioration of the display grace of a liquid crystal display can be suppressed, it has the merit that the above-mentioned structure can be formed without elevation of a manufacturing cost, by making narrower especially the portion corresponding to the shading section of the formation pattern of a coloring layer to the upper coloring layer at latus width of face to a lower layer coloring layer.

[0029] In addition, although the shading section configuration of an abbreviation trapezoid is constituted from an above-mentioned operation gestalt by making width of face of a formation pattern small one by one from a lower layer coloring layer to the upper coloring layer when forming the shading section, you may build the configuration of a trapezoidal shape by processing of etching and others.

[0030]

[Effect of the Invention] According to this invention, the following effects are done so as explained above.

[0031] Since according to the claim 1 it is constituted so that width of face may become small as the shading section goes to the upper layer from a lower layer and the shape of toothing of the front face of the orientation film with which the side of the shading section will be mostly formed in the shape of a taper, and was formed on the shading section is eased, on the occasion of rubbing processing, it is hard to generate poor rubbing, and deterioration of display grace can be prevented.

[0032] According to a claim 2 or the claim 4, even if it does not process especially the side of the shading section, the almost same effect as the case where the side of the shading section is processed in the shape of a taper can be acquired by changing the formation pattern of the coloring layer of a lower layer and the upper layer one by one, and forming so that the periphery section of the upper pattern may come inside the periphery section of a lower layer pattern. Moreover, according to this method, the above-mentioned structure can be formed, without causing elevation of a manufacturing cost only by changing a pattern configuration.

[Translation done.]